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Molecular mechanisms of autophagy in plants: Role of ATG8 proteins in formation and functioning of autophagosomes

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Abstract

© 2016, Pleiades Publishing, Ltd.Autophagy is an efficient way of degradation and removal of unwanted or damaged intracellular components in plant cells. It plays an important role in recycling of intracellular structures (during starvation, removal of cell components formed during plant development or damaged by various stress factors) and in programmed cell death. Morphologically, autophagy is characterized by the formation of double-membrane vesicles called autophagosomes, which are essential for the isolation and degradation of cytoplasmic components. Among autophagic (ATG) proteins, ATG8 from the ubiquitinlike protein family plays a key role in autophagosome formation. ATG8 is also involved in selective autophagy, fusion of autophagosome with the vacuole, and some other intracellular processes not associated with autophagy. In contrast to yeasts that carry a single ATG8 gene, plants have multigene ATG8 families. The reason for such great ATG8 diversity in plants remains unclear. It is also unknown whether all members of the ATG8 family are involved in the formation and functioning of autophagosomes. To answer these questions, the identification of the structure and the possible functions of plant proteins from ATG8 family is required. In this review, we analyze the structures of ATG8 proteins from plants and their homologs from yeast and animal cells, interactions of ATG8 proteins with functional ligands, and involvement of ATG8 proteins in different metabolic processes in eukaryotes.

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Keywords

ATG8, autophagosome, autophagy, plants, stress